Tactical Decision Support Using Fire Alarm Panels

IAFC International Fire and Rescue, 2000

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Background

Fire alarm systems in large buildings incorporate a display for the fire service:

Location of alarms, device type, sequence

"… to enable responding personnel to identify the location of a fire quickly and accurately and to indicate the status of emergency equipment or fire safety functions that might affect the safety of occupants …"

Located in fire command center or near likely point of entry by the responding fire service.

The Problem

- Variations among manufacturers and models make use confusing
- Information usefulness limited to initial location of the fire
- Most fire departments report that they simply ignore the fire alarm system after the initial alarm

Fire Service Needs

- **At Dispatch**
  - Confidence in alarm, size and growth rate
- **On Arrival**
  - Location of the fire, the occupants, current conditions
  - How to get to the fire
  - Staging areas, standpipes, other resource or safety issues (OSHA 2 and 2)
- **During the Incident**
  - Fire spread and growth, area(s) involved
  - Systems status, i.e., ventilation
  - Location of fire fighters
  - Controls for communications and ventilation

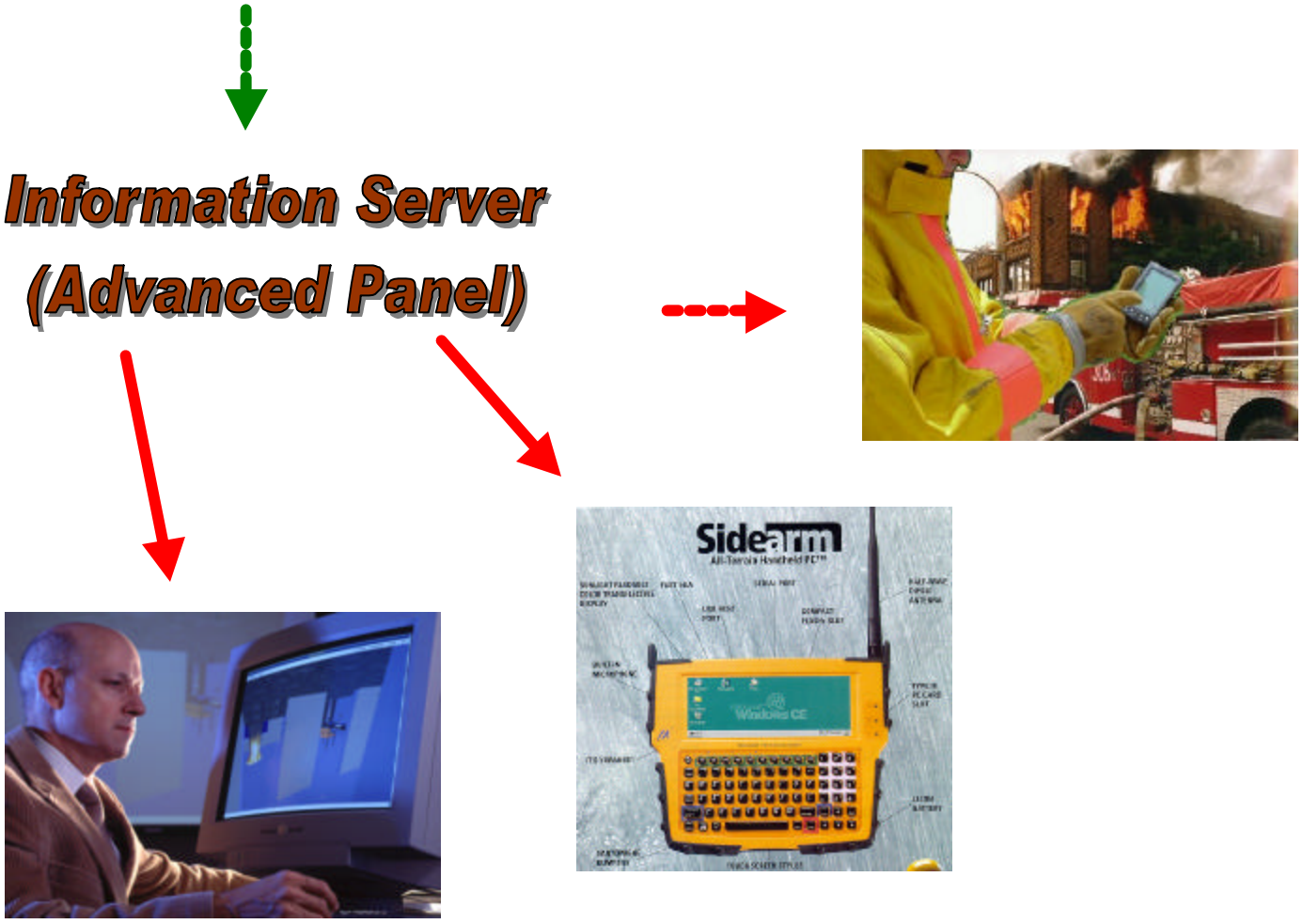
Incident Management

- Reliability of the signal (is it really a fire?)
- Provide tactical decision aids – better information
- Support resource allocation and safety
- Pre-processed information
  - Fire impact areas instead of numbers of alarms
  - Temperature and visibility distance
  - Limits of protective clothing
- Information from other systems/sensors
- Resources, hazards, secure or high value areas

The Proposed Solution
Advanced Fire Service Interface

- Develop a prototype advanced (smart) fire alarm panel that will:
  - Isolate the location of a fire in a building
- Develop a tactical decision aid for the fire service:
  - Scalable, Prioritized communication
  - Increase efficiency (allocation of resources)
  - Improve firefighter safety

Sensor Map plus the Building Plan



Fire Service Support Through Focus Groups

- South East / South West - Fire Chiefs, April, 1998
  - The Phoenix and Atlanta Fire Department have volunteered to test our systems in “live fire” demonstrations
- IAFC (OLS), September, 1998
- NFPA 72, January, 2000
- IAFC, August, 2000

The Questions to the Focus Groups

- Arranged through IAFC, experienced incident commanders from large departments..

- Asked:
  - What do you want to know?
  - When do you want to know it?
  - Where do you want to know it?
  - How can it best be presented?

Industry Support (NEMA)

- **Develop Prototype Graphics for Panels**
  - Fire service doesn't use current panels – why?
- **Develop a Model of Sensors**
  - Current Detectors, then ...
- **Do Large Scale Verification**
  - Conduct a Field Demonstration
- **Consortium**
  - Siemens/Cerberus, Simplex, Honeywell/Notifier, EST, NEMA

NIST Perspective

- **Reliability of the signal** (is it a fire?)
  - Multimode sensors
  - Dispersed sensors
- **How big is the fire** (if it is, how soon …)
  - Flashover, backdraft, limits of protective clothing
- **Tactical decision aid**
  - Impact of ventilation, what happens?
- **Panel display** – “information wherever it is needed”
  - Fire service connection
  - Done by panel manufacturers

Delivery of Information

- Building Management
  - Building security, fire station, …

- Panel/Laptop
  - Laptop “in the truck”
  - Building annunciator panel

- Simple Display
  - Handheld device

Prototype symbology for the various components of the building system

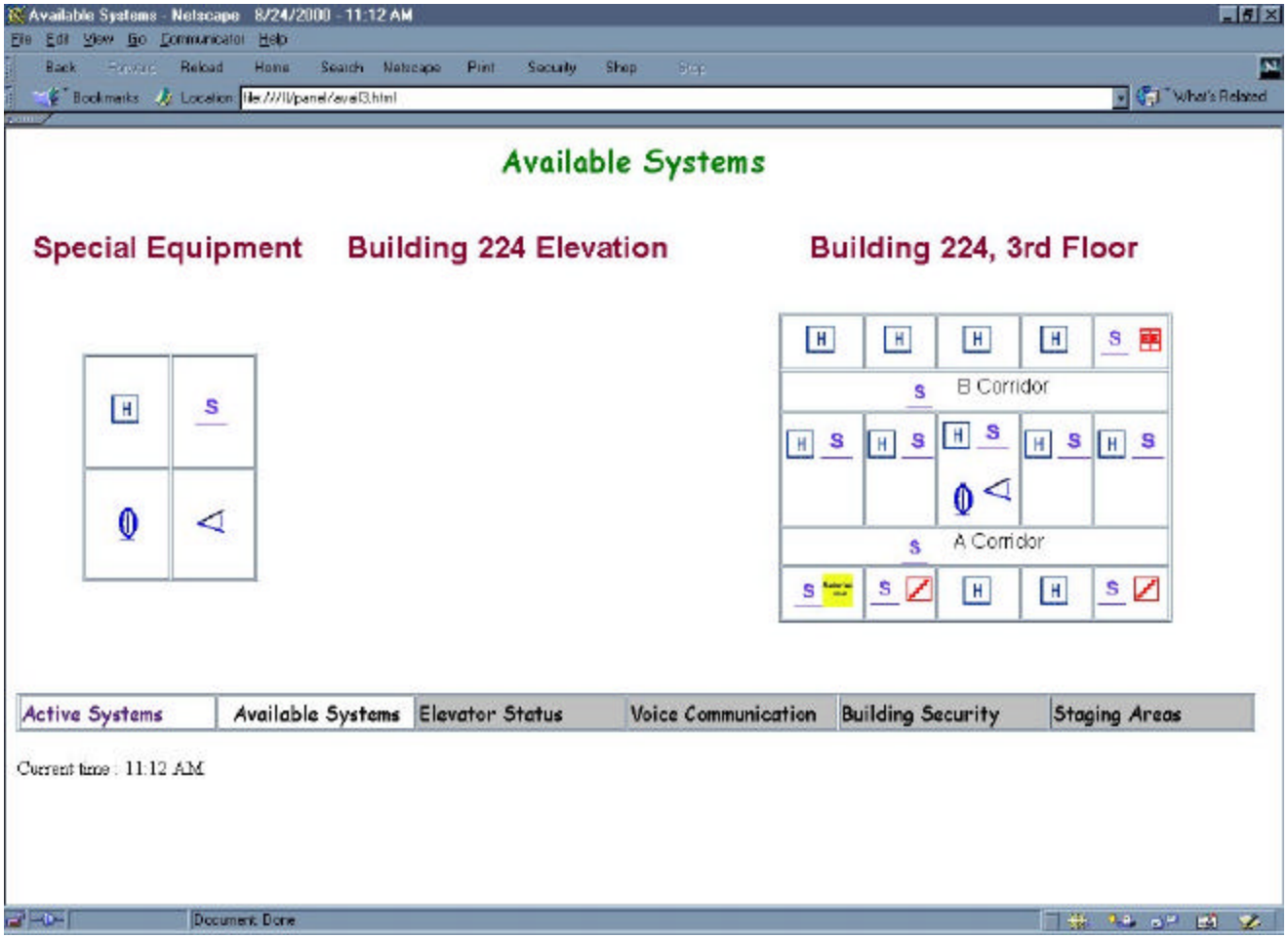
			
Smoke Detector	**Heat Detector**	**Fire**	**Sprinkler**

21 proposed at the moment - Usability issues remain

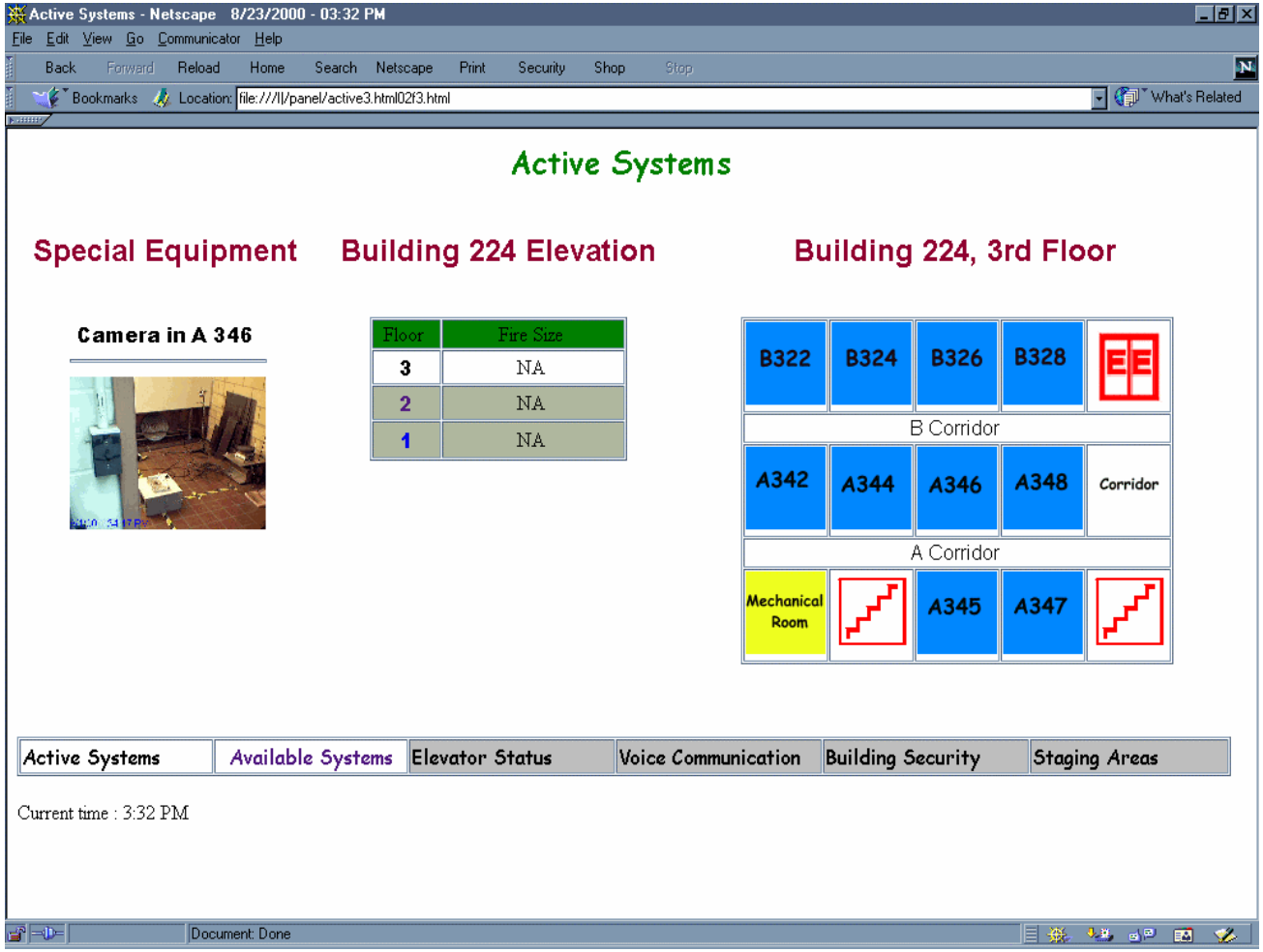
The Layout in Building 224

Outside	Corridor	Experiment

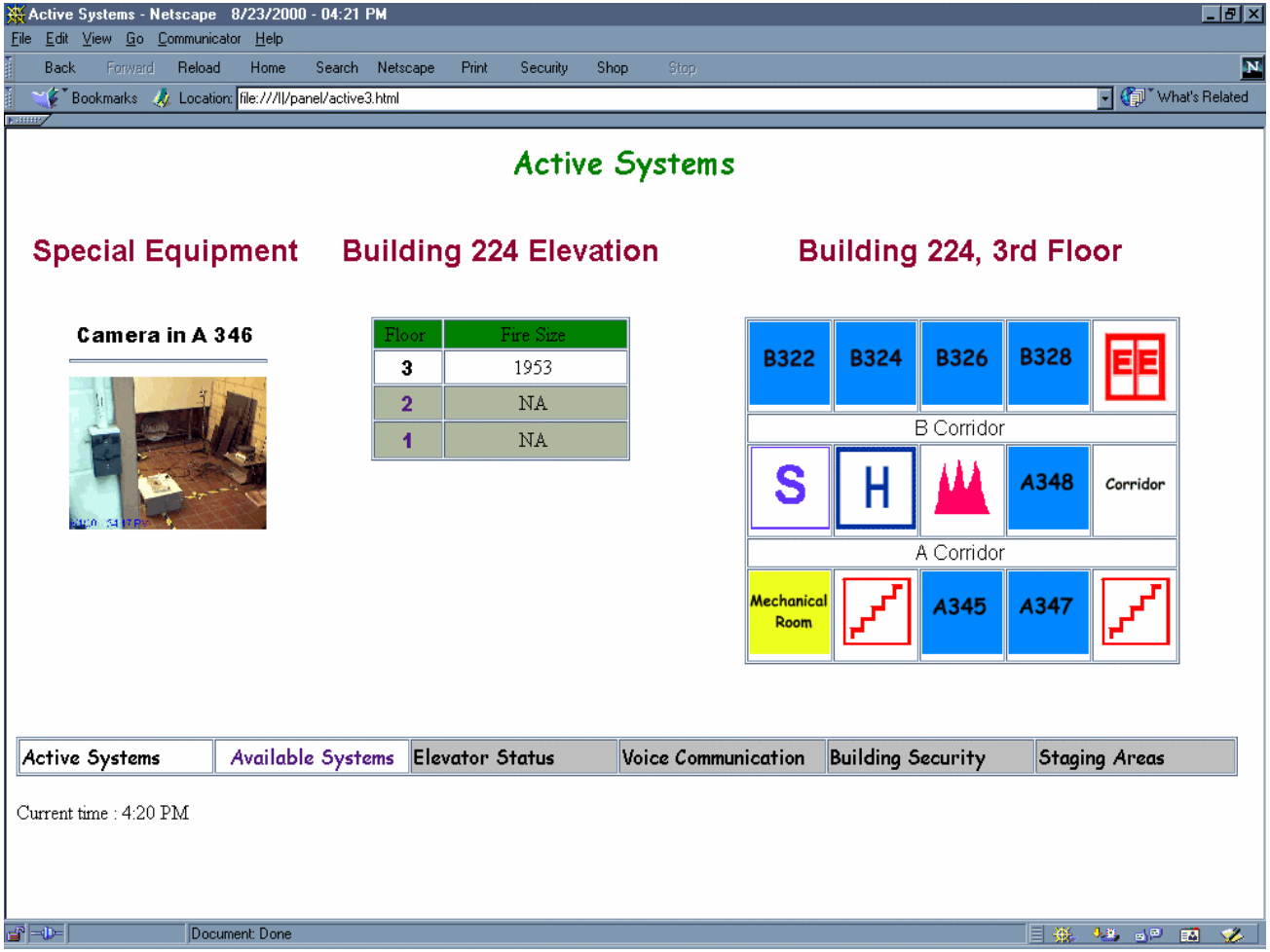
Example of Available Systems



Example of Active Systems



Example of Active Systems (30 seconds)



Initial fire ~ 20 kW

Click the picture to see the initial fire

Active Systems - Netscape 8/23/2000 - 03:32 PM

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: file:///I|/panel/active3.html02f3.html What's Related

Active Systems

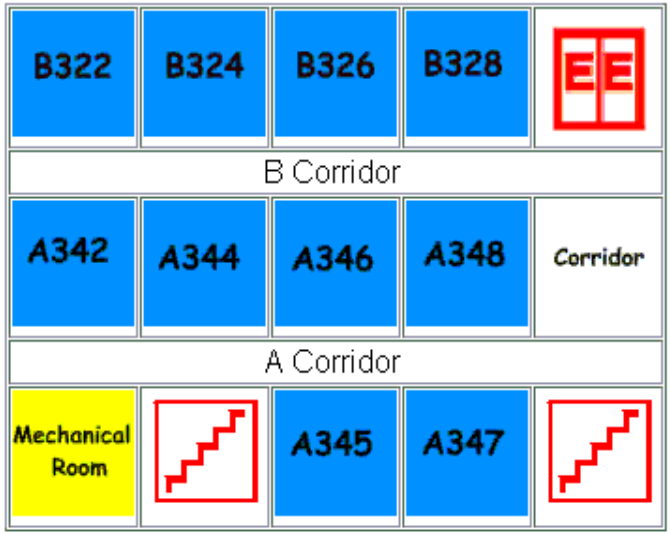
Special Equipment

Camera in A 346

Building 224 Elevation

Floor	Fire Size
3	NA
2	NA
1	NA

Building 224, 3rd Floor



Active Systems	Available Systems	Elevator Status	Voice Communication	Building Security	Staging Areas

Current time : 3:32 PM

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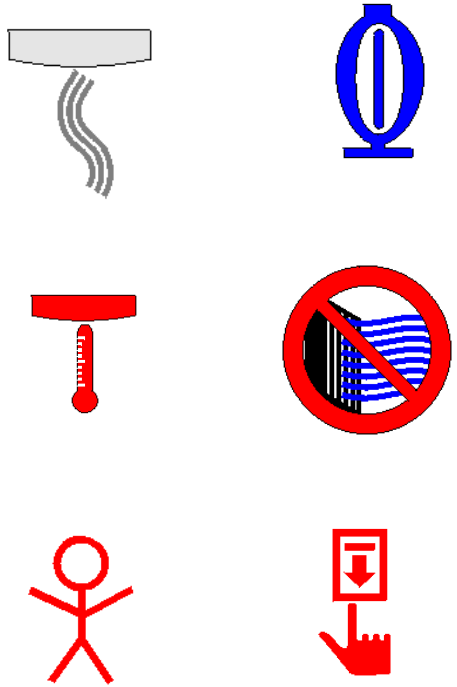
NFPA 72 Task Group

- Working groups
  - Icons (Usability, Color, Scaling)
  - Control functions
  - Information and presentation

- Proposal closing date November 5, 2000

Illustrative Icons

- Drawn from Japanese standard and NFPA 170 symbols
- Must represent three states
  - Function not present
  - Function present and not active
  - Function present and active



Control Functions

- Emergency voice communications
  - Zone, group, all call
- Query sensors (incl. those not in alarm)
- Manual ventilation control (stairways)
- Elevators? (status of recall only?)

Guide for Presentation and Information

Somewhat intuitive (some training)

Consistent

Available in building, outside, in vehicles, handheld, …

Familiar

Caution about color blindness

Presentation and Information

- Multiple windows
- Diagrams vs. drawings
- Analog gauges with “normal range”
- Primary vs. secondary information
  - Automatic display vs. display on demand
- Place holder for fire fighter locator

Contact Us

- See the panel proposal and this presentation at
  http://panel.nist.gov/

- Contact us through
  inquiries@fire.gov